Situationally Trained Rules for Flow Control in Production Systems and their Integration in Simulation Systems

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The doctoral thesis „Situationally Trained Rules for Flow Control in Production Systems and their Integration in Simulation Systems“ addresses the sensitive entrepreneurial problem of production optimization. Time-critical scheduling is in the focus of the research.

The developed method achieves to come up with a solution for planning problems of machine scheduling in linear time. Furthermore, the solution space is confined considerably because only active schedules are generated. The optimal schedule is always an active one with respect to the target function. In situations which require a decision, the method creates a conflict set containing all relevant jobs. A machine learning component is integrated to resolve the conflict set adequately. This procedure selects the appropriate priority rule for the situation based on attributes which describe the situation. It ensures that only one path, which leads to a good solution, has to be followed. The time period prior to the production process is used to train the machine learning component by generating exemplary solutions. The developed method can be adapted at run-time.

The method is evaluated against alternative methods using standardized benchmark problems and obtained very good results.